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Patentanmeldung Nr. Patent application No. Demande de brevet n°

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Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
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R C van Dijk

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(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
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Sprayable oil-like formulations

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Sprayable Oil-like Formulations

Field of the invention

This invention relates to transparent, sprayable cosmetic oil-in-water formulations that provide the superior moisturization typically associated with and comparable to standard oil formulations.

Background of the Invention

A clear and transparent appearance of personal care and cosmetic products has become an important feature as the consumer associates it with attributes such as pureness, mildness, cleanliness and freshness. Another benefit of a clear appearance, in combination with a transparent packaging, is that the consumer is readily able to visually view and inspect the product.

One particular product category, where clearness is an important attribute, are cosmetic oils. These are very traditional and well-established skin-care products for adults as well as for babies. They have been used for many years and have become attractive due to their excellent skin moisturizing and protecting properties that are superior to ordinary creams and lotions.

However, due to their very low consistency, oils are difficult to apply on the skin and they usually leave an undesired long lasting oily/greasy after-use skin feel.

Sprays are an attractive vehicle to apply liquid compositions for topical use. However oil sprays are hampered with toxicological problems due to inhalation of finely dispersed oil droplets.

There is a need for oily or oil-like formulations that have the same beneficial properties as the oils that are currently used but lack the oily/greasy skin feel of traditional oil formulations. There is a further need for oily or oil-like formulations that have improved moisturizing properties. There is an additional need for oily or oil-like formulations that are sprayable and are devoid of the toxicological problems found with traditional oils.

Ordinary light oil sprays that overcome the application issue of oils and have improved skin feel are not safe enough for baby usage due to toxicological concerns when product is inhaled.

The oil-like formulations of this invention have been found to provide a solution to these needs.

Summary of the invention

The present invention concerns a clear sprayable oil-in-water emulsion wherein the oily component comprises one or more silicone waxes, optionally in admixture with one or more suitable oils, the aqueous phase comprises one or more polyols or hydroxy acids or their salts and and wherein the emulsion further comprises an emulsifier.

Suitable silicone waxes are condensation products of alkenyl substituted polysiloxanes and polysiloxanes with silane functionalities.

Suitable oils may be selected from silicone oils, natural oils, fatty acid esters, ether and mono-, di- and triglycerides, cyclic, branched or linear hydrocarbons, linear or branched fatty alcohols (Guerbet alcohols), and mixtures thereof. Of particular interest are silicone oils.

In particular embodiments, this invention concerns a clear sprayable oil-in-water emulsion wherein the oily component comprises:

(a) one or more silicone waxes;

(b) one or more silicone oils; and

(c) optionally one or more suitable oils, and

wherein the aqueous phase comprises one or more polyols or hydroxy acids or their salts and wherein the emulsion further comprises an emulsifier.

Preferably the polyol is a polyhydroxy alkane or -cycloalkane.

Preferably the emulsifier is an ethoxylated fatty alcohol.

Detailed description of the invention

As used herein the term 'clear' means that the emulsion is transparent or essentially transparent when present in a typical consumer product, allowing ready viewing of objects behind it (when packed in a transparent container or packaging). In particular, the formulations of the present invention have a transparency (T % as measure unit) of T ≥95%. The transparency may be measured with a UV/VIS double ray spectrometer at a wavelength of 800 nm.

The term 'sprayable' means that the composition can be applied by a standard spraying device used in consumer products. In particular, sprayable emulsions have a viscosity of < 100mPs measured with a plate/cone rotation rheometer at a constant shear rate of 500 1/s. Preferably, sprayable emulsions in accordance with the present invention have a viscosity from 1 – 30 mPs, in particular from 1- 10 mPs at a shear rate of 500 1/s.

Silicone Waxes

The silicone waxes for use in the emulsions according to the invention are copolymeric condensation products of alkenyl substituted polysiloxanes and polysiloxanes with silane (Si-H) functionalities. Particular alkenyl substituted polysiloxanes are those

wherein the alkenyl functions are end groups and particular polysiloxanes with silane (Si-H) functionalities are those wherein the silane groups are end groups.

The alkenyl substituted polysiloxanes and polysiloxanes with silane functionality are linear but in some instances may have limited branching, for example less than about 2 mole % of the siloxane units, in which case the polysiloxanes are 'substantially linear'.

Preferably, the copolymeric silicone waxes are obtained by condensation of about 10 – 40 parts, in particular of about 20 – 35 parts, more in particular from about 25 to about 35 parts of alkenyl substituted polysiloxane with about 0.25 – 5 parts, in particular of about 0.5 – 2 parts, more in particular from about 0.65 to about 1.5 parts of polysiloxanes with silane (Si-H) functionalities.

Preferred alkenyl substituted polysiloxanes are those wherein the alkenyl group is vinyl, allyl, hexenyl or cyclohexenyl, more preferably vinyl.

In specific embodiments of this invention, the silicone wax is a condensation product of divinyldimethicone and a silane-terminated dimethicone.

These silicone waxes can be prepared by condensing the alkenyl substituted polysiloxanes with the polysiloxanes with silane functionalities in the presence of a suitable catalyst, for example a suitable metal catalyst such as Pt. The reaction can be done in the presence of an appropriate emulsifier, whereupon after addition of water an emulsion of the silicone wax in water is obtained.

Particular silicone waxes for use in the emulsions of the present invention are those described in US-6,013,682, more in particular the divinyldimethicone/dimethicone copolymer specifically described in the examples of said reference. Silicone-in-water emulsions of these waxes as well as their preparation are also described in this reference.

Preferred for use in the present invention are silicone waxes directly prepared in a emulsion as described in US-6,013,682 with a suitable non-ionic emulsifier, in

particular with an ethoxylated fatty alcohol. Of interest are silicone wax emulsions having a particle size in the range from about 0.3 to about 100 micrometers and a viscosity that is in the range of about 1 mm^2/sec at 25 °C to about 108 mm^2/sec at 25 °C. Of specific interest are wax emulsions of a particle size which is in the range of about 1 to about 100 micrometers and a viscosity which is the range of about 10^6 to about 10^8 mm^2/sec.

These emulsified silicone waxes can be readily used to prepare the emulsions according to the present invention.

Preferably, the silicone wax or waxes are present in the emulsions of the invention in an amount, which is in the range of 0.1 - 30%, preferably in the range of 2 – 18 %, more preferably from 5 - 12 % (w/w, relative to the total weight of the emulsion).

Oils

The emulsions of the present invention may contain suitable oils which are skin-compatible components or component mixtures that are non water-mixable and which may, for example, be silicone oils, natural oils, fatty acid esters, mono-, di- or triglycerides, or other oils, or mixtures thereof. Preferably, the oils are liquid at ambient temperature, in particular are liquid at 20 °C or at 25 °C. They can contain certain amounts of solid lipid components (e.g. fats) as long as the complete oily mixture is liquid at ambient temperature or at the temperatures mentioned above.

Of particular interest are silicone oils such as, for example cyclic silicones, dialkyl- or alkylarylsiloxanes, e.g., cyclomethicone, dimethyl polysiloxane and methylphenyl polysiloxane, as well as the alkoxylated and quaternized analogs thereof. Appropriate non-volatile silicone oils are e.g. polyalkylsiloxanes, polyalkylarylsiloxanes and polyethersiloxane-copolymers. A particularly suitable silicone oil can be a dimethylpolysiloxane having trimethylsiloxy groups at both molecular terminals, a methylphenylpolysiloxane having trimethylsiloxy groups at both molecular terminals, a copolymer of methylphenylsiloxane and dimethylsiloxane having trimethylsiloxy

groups at both molecular terminals, a cyclic dimethylsiloxane, or a cyclic methylphenylsiloxane.

Preferred silicone oils comprise cyclic dimethylsilicones, i.e. the cyclomethicones e.g. tetracyclomethicone, pentacyclomethicone, and linear dimethylsilicones, i.e. the dimethicones, including any mixture of these.

Other oils, which can be incorporated comprise natural oils or fats, or natural oil derivatives, in particular of vegetable origin. Examples are almond oil, soybean oil, sunflower oil, safflower oil, corn oil, canola oil, borage oil, evening primrose oil, grapeseed oil, wheat germ oil, avocado oil, jojoba oil, kernel oil, sesame oil, walnut oil, linseed oil, palm oil, olive oil, macadamia oil, castor oil, rapeseed oil, peanut oil, coconut oil, and turnip seed oil.

The emulsions may also contain mono-, di or triglycerides. These can be derived from saturated or unsaturated, linear or branch chained, substituted or unsubstituted fatty acids or fatty acid mixtures. Particular mono-, di- or triglycerides are mono-, di- or tri-C_{12-24} fatty acid glycerides, specifically mono-, di-or tri-C_{16-20} fatty acid glycerides, for example glyceryl monostearate, distearate or tristearate. Mixtures of mono-, di- and triglycerides can be derived from fractions of fatty acids. An example of the latter C_{12-18} fatty acid mono-, di- and triglycerides mixtures.

Suitable oils further comprise fatty components isolated from natural oils, in particular from the natural oils mentioned above i.e. pure triglycerides or mixtures thereof, or the latter components having been prepared chemically. These so-called trigycerides (or triacyl glycerines) are esters of glycerines with fatty acids or fatty acid mixtures, for example so called technical mixtures obtained by hydrolysis from fractions of oils or fats, or by fractioning fatty acid mixtures after hydrolysis.

The fatty acids in said triglycerides may be saturated or unsaturated, straight or branch chained, substituted or unsubstituted. Preferred triglycerides are those glycerines esters derived from fatty acids, either saturated or unsaturated, having from 10 to 60, in

particular from 12 to 36, more particularly from 12 to 24, preferably from 16 to 20 carbon atoms. Preferred such fatty acids are, for example, palmitic, palmic, oleic, lauric, myristic, stearic, hydroxystearic, behenic acid, or mixtures thereof. Within this group the triglycerides derived from saturated fatty acids are of particular interest.

They can also be mixed esters, i.e. tri-esters of glycerine with different fatty acids. Further such triglycerides are glycerine tristearate, also referred to as stearin, glycerine tribehenate, glycerine tripalmitate, glycerine trilaurate, glycerine trioleate, glycerine trimyristate.

Further oils are mono- or diglycerides, optionally in a mixture with the fats and oils mentioned herein, in particular with triglycerides. The mono- or diglycerides are derived from saturated or unsaturated, linear or branch chained, substituted or unsubstituted fatty acids or fatty acid mixtures. Particular mono- or diglycerides are mono- or di-C_{12-24} fatty acid glycerides, specifically mono- or di-C_{16-20} fatty acid glycerides, for example glyceryl monostearate, glyceryl distearate. Mixtures of mono-, di- and, optionally, triglycerides can be derived from fractions of fatty acids. An example of such mixture is a mixture of C_{12-18} mono-, di- and triglycerides.

The formulations may also comprise alkyl esters of fatty acids, wherein the alkyl group in the latter has from 1 to 30 carbon atoms, preferably from 12 to 24 carbon atoms. The fatty acids in said alkyl esters in particular are C_{12-30} fatty acids, more in particular C_{12-20} fatty acids. The alkyl groups in said esters preferably are derived from fatty alcohols as well as of mixtures thereof, which, for example, are obtained by high pressure hydrogenation of technical mixtures of the methyl esters derived from fats or oils.

Preferred are the alkyl esters of C_{16-24} fatty acids, more preferably from C_{16-18} fatty acids, and C_{1-30} fatty alcohols, preferably C_{8-24} fatty alcohols, more preferably C_{12-20} fatty alcohols. Examples are the C_{16}-C_{40}-alkyl stearates, in particular the C_{20}-C_{40}-alkyl stearates.

Further oils are liquid esters from linear, saturated or unsaturated C_6-C_{22}-fatty acids with linear or branched, saturated or unsaturated C_6-C_{22}-fatty alcohols respectively esters from branched C_6-C_{13}-carboxylic acids with linear or branched, saturated or unsaturated C_6-C_{22}-fatty alcohols.

Examples of oil components of the ester type are the following: decyl oleate, coco caprylate/-caprate (available under the tradename Cetiol® SN), hexyl laurate, myristyl isostearate, myristyl oleate, cetyl isostearate, cetyl oleate, stearyl isostearate, isostearyl myristate, isostearyl palmitate, isostearyl stearate, isostearyl isostearate, isostearyl oleate, isostearyl oleate, oleyl myristate, oleyl isostearate, oleyl oleate, oleyl erucate, behenyl isostearate, erucyl isostearate, erucyl oleate. Further oil components are the esters from linear C_6-C_{22}-fatty acids with branched alcohols, in particular 2-ethylhexanol (Cetiol® 868), esters from branched C_6-C_{22}-fatty acids with linear alcohols, esters from C_{18}-C_{38}-alkylhydroxycarboxylic acids with linear or branched C_6-C_{22}-fatty alcohols, esters from linear and/or branched fatty acids with multifunctional alcohols (e.g. propylene glycol, dimerdiol oder trimertriol) and/or Guerbet alcohols, as well esters from C_6-C_{22}-fatty alcohols and/or Guerbet alcohols with aromatic carboxylic acids, in particular benzoeic acids, esters from C_2-C_{12}-dicarboxylic acids with linear or branched alcohols having 1 to 22 carbon atoms (e.g. dioctyl malates).

Of particular interest in this regard are, e.g. stearyl stearate, palmityl stearate, stearyl behenate, cetyl stearate, cetyl behenate, cetyl palmitate, cetearyl behenate, behenyl behenate, stearyl heptanoate, stearyl octanoate, myristyl myristate, myristyl palmitate, myristyl stearate, myristyl isostearate, myristyl oleate, cetyl isostearate, cetyl oleate, stearyl isostearate, stearyl oleate, isostearyl myristate, isostearyl palmitate, isostearyl stearate, isostearyl isostearate, isostearyl oleate, isostearyl behenate, isostearyl oleate, oleyl myristate, oleyl palmitate, oleyl stearate, oleyl isostearate, oleyl oleate, oleyl behenate, oleyl erucate, behenyl isostearate, behenyl oleate, erucyl isostearate.

Of further interest are esters of C_{18}-C_{38}-alkylhydroxycarbonic acids with linear or branched C_6-C_{22}-fatty alcohols, esters of linear and/or branched fatty acids with poly-alcohols (e.g. propylene glycol, dimerdiol or trimertriol) and/or Guerbet alcohols.

Fatty alcohols

Other oil components that may be used comprise fatty alcohols. Fatty alcohols comprise, for example, C_{12}-C_{50}-fatty alcohols, in particular the C_{12}-C_{24}-fatty alcohols, more in particular the C_{16}-C_{22}-fatty alcohols that are derived from natural fats, oils or waxes such as, for example, myristyl alcohol, 1-pentadecanol, cetylalcohol, 1-heptadecanol, stearyl alcohol, 1-nonadecanol, arachidyl alcohol, 1-heneicosanol, behenyl alcohol, brassidyl alcohol, lignoceryl alcohol, ceryl alcohol, myricyl alcohol, lauryl alcohol, capryl alcohol, caprinyl alcohol, cetyl alcohol, palmoleyl alcohol, isostearyl alcohol, oleyl alcohol, elaidyl alcohol, petroselinyl alcohol, arachidyl alcohol, gadoleyl alcohol, erucyl alcohol, including mixtures thereof such as cetearyl alcohol, $C_{12/13}$ fatty alcohol, as well as Guerbet alcohols. Preferred for use in the present invention, are saturated, straight or branch chained fatty alcohols. However also unsaturated, straight or branch chained alcohols can be used, optionally in a mixture with saturated alcohols.

Mixtures of fatty alcohols can evidently also be used, including fatty alcohol fractions obtained from the reduction of the corresponding fatty acid fractions derived from naturally occurring oils or fats such as, for example, almond oil, soybean oil, sunflower oil, safflower oil, corn oil, canola oil, borage oil, evening primrose oil, grapeseed oil, wheat germ oil, avocado oil, jojoba oil, sesame oil, walnut oil, linseed oil, palm oil, olive oil, castor oil, macadamia oil, rapeseed oil, peanut oil, coconut oil, and turnip seed oil. The fatty alcohols from which these products are derived can be saturated, straight or branch chained fatty alcohols. However also unsaturated, straight or branch chained alcohols can be used, optionally in a mixture with saturated alcohols. The fatty alcohols in particular are derived from natural fats, oils or waxes

Synthetic alcohols can also be used such as, for example, the linear fatty alcohols of an even number of carbon atoms resulting from the Ziegler-synthesis (Alfole®) or the partially branched alcohols resulting from the Oxo synthesis (Dobanole®).

Fatty acids

The compositions may also contain C_{14}-C_{40}-fatty acids, including mixtures thereof. Of particular interest are the C_{16}-C_{30}-fatty acids. These comprise, for example, myristic-, pentadecanoic-, palmitic-, margaric-, stearic-, nonadecanoic-, arachic-, behenic-, lignoceric-, cerotic-, melissic-, erucaic-, elaeostearic-, oleic-, lonolenic-, lauric acid as well as substituted fatty acids, e.g. hydroxy-substituted fatty acids such as, for example, 12-hydroxystearic acid, and the amides or monoethanolamides of these fatty acids.

Dialkyl(ene) ethers

The compositions may also contain dialkyl(ene) ethers which can be symmetric or asymmetric, straight or branch chained, saturated or unsaturated. Preferred are waxy, saturated C_6-C_{30}-dialkylethers, in particular C_6-C_{24}-dialkylethers. More preferred are C_6-C_{20}-dialkylethers, and particularly preferred are distearylethers and dibehenylethers. Dialkylethers of shorter chain length can also be used such as, for example, di-n-octylether, di-(2-ethylhexyl)-ether, laurylmethylether or octylbutylether, didodecylether.

These ethers can be obtained from the appropriate fatty alcohols in the presence of an acid catalyst following art-known procedures. Typical examples are the products that are obtained by the etherification of capron alcohol, capryl alcohol, 2-ethylhexyl alcohol, caprin alcohol, lauryl alcohol, myristyl alcohol, cetyl alcohol, palmoleyl alcohol, stearyl alcohol, isostearyl alcohol, elaidyl alcohol, petroselinyl alcohol, linolyl alcohol, linolenyl alcohol, oleyl alcohol, ricinus alcohol, elaeostearyl alcohol, arachidyl alcohol, gadoleyl alcohol, behenyl alcohol, erucyl alcohol and brassidyl alcohol, Guerbet alcohols, as well as mixtures thereof, which, for example, are obtained by high pressure hydrogenation of technical mixtures of the methyl esters derived from fats or oils.

Dialkyl(ene) carbonates

The dialkyl(ene) carbonates that can be used are symmetric or asymmetric, straight or branch chained, saturated or unsaturated. Preferred dialkyl(ene) carbonates are linear or branch chained, saturated or unsaturated C_{14}-C_{30}-dialkyl(ene) carbonates. More preferred are C_{16}-C_{24}-dialkyl carbonates and amongst these the saturated linear C_{16}-C_{22}-dialkyl carbonates. Particularly preferred is distearyl carbonate. Suitable dialkyl(ene) carbonates, are, for example, dihexyl-, dioctyl-, di-(2-ethylhexyl)- or dioleylcarbonate.

These dialkyl(ene) carbonates can be obtained by re-esterification of dimethyl- or diethyl carbonates with the corresponding hydroxy compounds following art-known procedures. Typical examples of dialkyl(ene) carbonates are re-esterification products of dimethyl- and/or diethyl carbonate with capron alcohol, capryl alcohol, 2-ethylhexyl alcohol, caprinalcohol, lauryl alcohol, myristyl alcohol, cetyl alcohol, palmoleyl alcohol, stearyl alcohol, isostearyl alcohol, elaidyl alcohol, petroselinyl alcohol, linolyl alcohol, linolenyl alcohol, oleyl alcohol, ricinus alcohol, elaeostearyl alcohol, arachidyl alcohol, gadoleyl alcohol, behenyl alcohol, erucyl alcohol and brassidyl alcohol, Guerbet alcohols, as well as technical mixtures thereof, that can be obtained by hydratation of methyl esters derived from suitable oils or fats or oil or fat fractions.

Dicarboxylic acids

Dicarboxylic acids that can be used are, for example, C_9-C_{34}-dicarbonic acids. These comprise, for example, octadecanedioic acid, tetratridecanedioic acid, etc. Of particular interest are the azelainic acids, which are C_9-dicarboxylic acids.

Hydroxy fatty alcohols

The hydroxy fatty alcohols used in the compositions are saturated or unsaturated, straight chain or branched. Preferred are C_{12}-C_{30}-hydroxy fatty alcohols, at which the position of the hydroxy-substituent depends upon the synthesis route and the starting

materials that have been used. Included are, for example, 1,10-decanediol, 1,2-hexadecanediol, 12-hydroxystearyl alcohol or hydroxy-Guerbet alcohols. Particularly preferred is 12-hydroxystearyl alcohol.

Further oil components

Further oily components, which can be used comprise, mineral and paraffin oils and synthetic oils, either aliphatic or aromatic, as well as mixtures thereof.

Further oil components that can be added are the Guerbet alcohols based on fatty alcohols having 6 to 18, in particular 8 to 10 carbon atoms.

Still further oil components that are hydrocarbons comprise, for example, squalane, squalene, paraffine oils, isohexadecane, isoeicosane or polydecene as well as dialkylcyclohexanes.

The total amount of oils or oil components in the emulsions according to the invention can vary but generally is in the range of 0.1% - 15%, preferably 0.2% - 7%, more preferably 0.5% - 2,5% (w/w, relative to the total weight of the emulsion).

The total amount of the oily component in the emulsions of the invention, i.e. including all lipid components such as the silicone waxes and oils mentioned herein, may vary but generally is in the range of 2 – 45 %, preferably in the range of 4 - 25%, more preferably of 5 - 15% (w/w, relative to the total weight of the emulsion).

The aqueous phase contains one or more polyols or hydroxy acids or their salts. The polyol in particular is a polyhydroxy alkane or cycloalkane. Examples of such polyols are lower alkylene glycols such as ethylene, propylene and butylene pentylene, and hexylene glycol polyols such as glycerine, sorbitol, cyclohexanediol and the like. Also hydroxy acids and their salts can be used, e.g. glycolic, lactic, citric acids and the salts thereof. Of particular interest are propylene glycol and glycerine.

Polyols are added to adjust the refractive index of the aqueous phase to make it as close as possible to that of the oil phase. The refractive indices of both phases should be similar and in particular should not differ more than about 0.003, in particular about 0.002 preferably not more than 0.0012.

The quantity of the polyol that is added therefore is selected such that the refractive index of the aqueous face meets these criteria.

The total amount of the polyols in the emulsions of the invention may vary but generally is in the range of 20 % - 60%, preferably in the range of 30 % - 50 %, more preferably of 35 % - 45 % (w/w, relative to the total weight of the emulsion).

The aqueous or the oil phase in the emulsions of the invention may contain further components customarily used in skin-care products, e.g. certain active ingredients, perfumes, emollients and the like.

The aqueous phase in the emulsions of the invention may be present in varying amounts, but usually is present in amounts which are in the range of 50 – 98 %, preferably in the range of 70 – 96 %, more preferably of 85 – 95 % (w/w, relative to the total weight of the emulsion).

The compositions according to the invention further contain an emulsifier, which is selected from ethoxylated or propyloxylated fatty alcohols. These products can be obtained by an addition reaction of the appropriate amount of ethylene or propylene oxide and a fatty alcohol. In particular, the ethoxylated or propyloxylated fatty alcohols are derived from C_{8-24} fatty alcohols, more in particular C_{8-24} fatty alcohols, still more in particular C_{8-16}-fatty alcohols, including mixtures thereof. The ethoxylated or propyloxylated fatty alcohols may contain from 1 to 50, in particular 3 to 40, more in particular 5 to 30 ethoxy or propoxy units. In certain embodiments, the ethoxylated or propoxylated fatty alcohols contain from 3 to 10 ethoxy or propoxy units while in other embodiments said alcohols contain from 20 to 25 ethoxy or propoxy units. In certain other embodiments mixtures of ethoxylated alcohols of both groups are used. Preferred

are the ethoxylated fatty alcohols. Also suitable would be block polymers of the above mentioned PEG /PPG fatty alcohols.

The fatty alcohols from which these products are derived can be saturated, straight or branch chained fatty alcohols. However also unsaturated, straight or branch chained alcohols can be used, optionally in admixture with saturated alcohols. The fatty alcohols in particular are derived from natural fats, oils or waxes. Fatty alcohols comprise, for example, C_{12}-C_{50}-fatty alcohols, in particular the C_{12}-C_{24}-fatty alcohols, more in particular the C_{16}-C_{22}-fatty alcohols that are derived from natural fats, oils or waxes such as, for example, myristyl alcohol, 1-pentadecanol, cetylalcohol, 1-heptadecanol, stearyl alcohol, 1-nonadecanol, arachidyl alcohol, 1-heneicosanol, behenyl alcohol, brassidyl alcohol, lignoceryl alcohol, ceryl alcohol, myricyl alcohol, lauryl alcohol, capryl alcohol, caprinyl alcohol, cetyl alcohol, palmoleyl alcohol, isostearyl alcohol, oleyl alcohol, elaidyl alcohol, petroselinyl alcohol, arachidyl alcohol, gadoleyl alcohol, erucyl alcohol, including mixtures thereof such as cetearyl alcohol, $C_{12/13}$ fatty alcohol, as well as Guerbet alcohols.

Mixtures of fatty alcohols can evidently also be used, including fatty alcohol fractions obtained from the reduction of the corresponding fatty acid fractions derived from naturally occurring oils or fats such as, for example, almond oil, soybean oil, sunflower oil, safflower oil, corn oil, canola oil, borage oil, evening primrose oil, grapeseed oil, wheat germ oil, avocado oil, jojoba oil, sesame oil, walnut oil, linseed oil, palm oil, olive oil, castor oil, macadamia oil, rapeseed oil, peanut oil, coconut oil, and turnip seed oil.

Of particular interest are the ethoxylated C_{8-24}-fatty alcohols, preferably the ethoxylated C_{8-16}-fatty alcohols, having from 3 to 30 ethoxy units.

Examples are ethoxylated $C_{12/13}$ alcohols (Pareth) and ethoxylated lauryl alcohol (Laureth).

The total amount of the emulsifier in the emulsions of the invention may vary but generally is in the range of 0.05 % - 10 %, preferably in the range of 0.1 % - 5 %, more preferably of 0.3 % - 2 % (w/w, relative to the total weight of the emulsion).

The pH of the oil-like emulsions of this invention is selected such that they are skin-compatible. In general it is contemplated that a good skin-compatible pH is in the range of pH 4 to 8, preferably in the range of pH 5 to 6. A particularly attractive pH is pH 5.5 which is kept more or less stable, e.g. within a range of pH +/- 0.2.

To stabilize the pH suitable buffering agents may be added such as citric acid, lactic acid or appropriate salts thereof.

The emulsions according to the present invention may contain further ingredients such as preservatives, active ingredients, perfumes and the like.

The refractive index of the complete formulation may vary but specific embodiments of this invention have a refractive index of about 1.3996 to about 1.4216.

The formulations of the invention have properties similar to an oil. They additionally are transparent and liquid, having the appearance and viscosity of an oil. They moreover have the unique advantage of being sprayable and still being safe enough for baby usage. Moreover, they possess superior moisturizing activity.

The emulsions according to the present invention are sprayable, without toxic side-effects. They moreover have a soft, moisturizing skin feel of standard oil-based formulations without greasiness.

The emulsions according to the present invention, while not being oil-based as in classical oil formulations, nevertheless deliver similar moisturizing and skin protecting properties of a classic oil (superior to ordinary oil-water / water-in-oil formulations).

Examples

Example 1

Specification name	Inci	Weight [%]	Weight [g]
Dow Corning HMW 2220 non-ionic emulsion	Divinyldimethicone/Dimethicone Copolymer, C12-C13 Pareth-3/C12-C13 Pareth-23	6,80000	307,02000
Polysorbate 20	Polysorbate 20	0,50000	22,57500
Propylene Glycol	Propylene Glycol	4,00000	180,60000
Sodium Lactate 50%	Sodium Lactate	10,00000	451,50000
Water, demineralized	Aqua	36,06740	1628,44311
Glycerin 99,5%	Glycerin	41,49900	1873,67985
Citric Acid	Citric Acid	0,16660	7,52199
Methylparaben	Methylparaben	0,20000	9,03000
Perfume BBA PN 7536	Perfume	0,01700	0,76755
Sodium Chloride	Sodium Chloride	0,75000	33,86250
		100,00000	4515,00000

The process:

1) Premix fragrance and polysorbate 20.
2) Use approximately 2% of the water quantity specified to make citric acid solution.
3) Mix together propylene glycol, sodium lactate, glycerin, Nipagin M Sodium and remaining water.
4) Add fragrance premix.
5) Add citric acid solution.
6) Measure pH - as a guideline pH 5.4-5.5
7) In a separate beaker, premix DC HMW and Cyclopentasiloxane (only for example 2).
8) Add the water mix to the above slowly.

Measure refractive index, if necessary adjust either with water or glycerin in order to match the refractive index and obtain a transparent product.

Example 2

Specification name	Inci	Weight [%]
Dow Corning HMW 2220 non-ionic emulsion	Divinyldimethicone/Dimethicone Copolymer, C12-C13 Pareth-3/C12-C13 Pareth-23	6,80000
Cyclopentasiloxane	Cyclopentasiloxane	1,00000
Propylene Glycol	Propylene Glycol	4,00000
Sodium Lactate 50%	Sodium Lactate	10,00000
Water, demineralized	Aqua	43,19000
Glycerin 99,5%	Glycerin	35,01000

Claims

1. A clear sprayable oil-in-water emulsion wherein the oily component comprises one or more silicone waxes, optionally in admixture with one or more suitable oils, the aqueous phase comprises one or more polyols or hydroxy acids or their salts and and wherein the emulsion further comprises an emulsifier.

2. An emulsion according to claim 1 wherein the silicone waxes are condensation products of alkenyl substituted polysiloxanes and polysiloxanes with silane functionalities.

3. An emulsion according to claim 1 wherein the suitable oils are selected from silicone oils, natural oils, fatty acid esters, ether and mono-, di- and triglycerides, cyclic, branched or linear hydrocarbons, linear or branched fatty alcohols (Guerbet alcohols), and mixtures thereof.

4. An emulsion according to claim 3 wherein the suitable oils are silicone oils.

5. An oil-in-water emulsion according to claim 1 wherein the oily component comprises:

(a) one or more silicone waxes;
(b) one or more silicone oils; and
(c) optionally one or more suitable oils, and

wherein the aqueous phase comprises one or more polyols or hydroxy acids or their salts and wherein the emulsion further comprises an emulsifier.

6. An oil-in-water emulsion according to claim 5 wherein the oily component comprises:

(a) from 5 – 12 % of one or more silicone waxes;
(b) from 0.5 – 2.5 % ofone or more silicone oils; and

(c) optionally one or more suitable oils, and

wherein the aqueous phase comprises one or more polyols or hydroxy acids or their salts and wherein the emulsion further comprises from 0.3 – 2 % of an emulsifier.

7. An emulsion according to claims 1 - 6 wherein the polyol is a polyhydroxy alkane or -cycloalkane.

8. An emulsion according to claim 7 wherein the polyol is glycerine.

9. An emulsion according to claims 1 - 6 wherein the emulsifier is an ethoxylated fatty alcohol.

10. An emulsion according to claim 9 wherein the emulsifier is selected from ethoxylated C_{8-16} fatty alcohols.

Abstract

Sprayable Baby Oils

This invention relates to transparent, sprayable cosmetic oil-in-water formulations that provide superior moisturization comparable to oil.